

What is claimed is:

- 5 1. A shaft operator assembly (8) for powering a door (2) comprising a
movable door leaf (4) and a door shaft (6) geared to said door leaf
(4) for common movement, including a shaft connecting means
(20) for connecting a driven member (35) of said shaft operator as-
sembly (8) to said door shaft (6), wherein said shaft connecting
10 means (20) comprises a connecting plate element (29) secured to
or integrally configured with said driven member (35) and a shaft
connecting element (28) mountable non-rotatably, more particularly
positively non-rotatably, on said door shaft (6), said shaft connect-
ing element (28) including an axial opening (39) extending through
15 said shaft connecting element (28) for receiving non-rotatably,
more particularly positively non-rotatably, said door shaft (6) and
connectable or connected by a plate connecting portion (42) lo-
cated radial outside of said opening 39 to said connecting plate
element (29).
- 20 2. The shaft operator assembly as set forth in claim 1, wherein said
connecting plate element is a flat connecting plate (29) configured
separately from said shaft connecting element (28), said plate con-
necting portion (42) and said connecting plate (29) being intercon-
nectable preferably positively engagingly.
- 25 3. The shaft operator assembly as set forth in claim 2, wherein said
plate connecting portion (42) comprises at least one axial protu-
berance (43) and/or at least one axial retracting recess and said
connecting plate (29) has a structure configured complementary to
30 said plate connecting portion (42), corresponding with at least one
axial retracting recess (45) for receiving said protuberance (43)
and/or at least one axial protruding portion for engaging said re-

cess so that said plate connecting portion (42) and connecting plate (29) interlock.

- 5 4. The shaft operator assembly as set forth in any of the preceding claims, wherein said shaft connecting element (28) is shiftably mountable on said door shaft (6) and definably locked in place thereon by positive friction action against shifting out of place.
- 10 5. The shaft operator assembly as set forth in claim 4, wherein said shaft connecting element comprises a radial tapped hole for receiving a clamping cap screw (40) to lock said tube connecting element (28) to said drive tube (6).
- 15 6. The shaft operator assembly as set forth in any of the preceding claims, wherein the inner axial opening (39) of said shaft connecting element (28) comprises a protuberance (47) extending radial inwards for engaging a slot (24) extending axial on the contour of said door shaft.
- 20 7. The shaft operator assembly as set forth in any of the preceding claims, wherein an assortment of shaft connecting elements (28) having axial openings (39) differing in size and/or for positively accommodating door shafts (6) differing in contour.
- 25 8. The shaft operator assembly as set forth in any of the preceding claims where relating back to claim (2), wherein said shaft connecting element (28) and said connecting plate (29) are secured to each other by means of cap screws (38).

9. The shaft operator assembly as set forth in any of the preceding claims, wherein said driven member (35) is formed by or comprises a quill shaft or hollow shaft(36) totally housed in a gearcase.
- 5 10. The shaft operator assembly as set forth in any of the preceding claims, wherein said connecting plate (29) is secured non-rotatably to said driven member (35) by means of a coupler (27).
- 10 11. The shaft operator assembly as set forth in claim 9 or claim 10, wherein said coupler (27) comprises an engaging portion (52) positively engaging non-rotatably said hollow shaft (36).
- 15 12. The shaft operator assembly as set forth in claim 10 or 11, wherein said connecting plate (29) is clasped by said coupler (27) and comprises on the side (44) opposite said driven member (35) for facing to said door shaft a receiving recess (46) in which the clasping portion (48) of said coupler (27) is fully receivable.
- 20 13. The shaft operator assembly as set forth in any of the preceding claims, wherein said coupler (27) comprises a flanged portion (48) for positively receiving said connecting plate (29) non-rotatably for axial shifting thereof.
- 25 14. The shaft operator assembly as set forth in claim 12 and 13, wherein the outer contour of said flanged portion (48) of said coupler (27) is insertable non-rotatably into said axial opening (39) of said shaft connecting element (28) for axial shifting thereof.
- 30 15. The shaft operator assembly as set forth in any of the preceding claims, wherein the outer contour of said plate-type flanged portion (48) of said coupler (27) has a modified hexagonal shape in which four flats (61-64) are located by their centerpoints equispaced ra-

dially from said longitudinal centerline, a fifth edge (66) being configured nearer to said longitudinal centerline and longer and a sixth edge (65) being adapted to the contour (47) of said axial opening (39) of said tube connecting element (28) serving to engage said drive tube (6).

5

16. The shaft operator assembly as set forth in any of the preceding claims, wherein said connecting plate element (29) is locked in place by a cap screw (30) extending centrally axial in said driven member (35) in preventing axial movement thereof by it being drawn into contact with a flat of said driven member (35).

10

17. The shaft operator assembly as set forth in claim 16, wherein said coupler (27) is locked in place by a cap screw (30) extending centrally axial in said driven member (35) in preventing axial movement thereof by said coupler (27) with said connecting plate (29) being drawn into contact with said driven member (35).

15

18. The shaft operator assembly as set forth in any of the preceding claims, wherein an assortment of connecting plate elements (29) differing in size is provided for connecting a variety of shaft connecting elements (28), each of which can be secured to said driven member (35) by the same coupler (27).

20

19. The shaft operator assembly as set forth in any of the preceding claims, wherein said connecting plate (29) and said shaft connecting element (28) are made of zinc die-cast.

25

20. The shaft operator assembly as set forth in any of the preceding claims, wherein said driven member (35) is arranged on a gear-case (34) featuring a recess (56) for receiving at least in part said

30

connecting plate element (29,55) arranged on said driven member (35).

5 21. A door (2) including a door leaf (4) and a door shaft (6) geared thereto, wherein a shaft operator assembly (8) as set forth in any of the preceding claims is connected to said door shaft (6).

10 22. The door as set forth in claim 21, wherein said door shaft (6) is a torsion spring shaft provided full-length with a slot (24).

23. A method for connecting a shaft operator assembly (8) as set forth in any of the preceding claims to a door shaft (6) comprising the steps:

- 15 a) mounting said shaft connecting element (28) on said door shaft (6),
- b) moving said shaft operator assembly (8) with said connecting plate element (29) arranged on said driven member in a direction radial to the longitudinal centerline of said door shaft into the assembly position at the end of said door shaft,
- 20 c) securing in situ said shaft operator assembly (8) and fastening said shaft connecting element (28) on said connecting plate element (29),
- 25 d) locking said shaft connecting element (28) in place to prevent displacement on said drive tube (6), more particularly by means of clamping cap screws (40).

24. The method as set forth in claim 23, comprising prior to step b) the steps:

- 30 a1) mounting a connecting plate (29) used as said connecting plate element on said driven member (35) and
- a2) bracing said connecting plate (29) by means of a central axial bracing means (27, 30, 31) to said driven member (35).

25. A method for connecting a shaft operator assembly (8) as set forth in any of the preceding claims to a door shaft (6) comprising furthermore the steps:

- 5 e) securing said connecting plate element (29) non-rotatably to said shaft connecting element (28),
- f) mounting said shaft operator assembly (8) with said shaft connecting element (28) on said door shaft (6)
- g) securing in situ said shaft operator assembly (8),
- 10 h) locking said tube connecting element (28) in place to prevent displacement on said drive tube (6) by means of locking cap screws (40.).

26. The method as set forth in claim 25, wherein step e) involves:

- 15 e1) securing said connecting plate (29) used as said connecting plate element to said tube connecting element (28) positively non-rotatably,
 - e2) mounting the resulting unit on said driven member (35),
 - e3) inserting said coupler (27) into said unit thus formed
 - 20 through said opening (39) of said tube connecting element (28),
 - e4) bracing said connecting plate (29) on said driven member (35) by means of said coupler (27),
- the sequence of steps e2) and e3) being optional.